Ley de Kirchoff

$$L\frac{dI}{dt} + RI + \frac{Q}{C} = E \qquad\qquad I = \frac{dQ}{dt} \Rightarrow \boxed{I' = \frac{d^2Q}{dt^2}} = \frac{dI}{dt}$$

$$2\frac{d^2Q}{dt^2} + 16\frac{dQ}{dt} + \frac{1}{0,02}Q = 300V$$

$$\frac{2\frac{d^2Q}{dt^2} + 16\frac{dQ}{dt} + 50Q}{2} = \frac{300V}{2}$$

$$\frac{d^2Q}{dt^2} + 8\frac{dQ}{dt} + 25Q = 150V$$

Aplicando la transformada

$$\mathcal{L}\left[\frac{d^2Q}{dt^2}\right] + 8\mathcal{L}\left[\frac{dQ}{dt}\right] + 25\mathcal{L}\left[Q\right] = 150V\mathcal{L}\left[1\right]$$

$$s^2Q(s) - \cancel{Q(0)}^{\,0} - \cancel{Q'(0)}^{\,0} + 8\left[sQ(s) - \cancel{Q(0)}\right]^{0} + 25Q(s) = \frac{150V}{s}$$

$$Q(s)\left[s^2 + 8s + 2s\right] = \frac{150V}{s}$$

$$Q(s)\left[s^2 + 8s + 25\right] = \frac{150v}{s}$$

$$Q(s) = \frac{150v}{s(s^2 + 8s + 25)}$$

$$= \frac{A}{s} + \frac{Bs + C}{s^2 + 8s + 25}$$

$$150V = A\left(s^2 + 8s + 25\right) + (Bs + c)s$$

$$= As^2 + A8s + A25 + Bs^2 + Cs$$

$$25A = 150$$

$$A = \frac{150}{25} \rightarrow \boxed{A = 6}$$

$$8A + C = 0$$

$$C = -8A$$

$$= -8 \times 6 \rightarrow \boxed{C = -48}$$

$$A + B = 0$$

$$B = -A \rightarrow \boxed{B = -6}$$

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$$Q\left(s\right) = \frac{6}{s} - \frac{6s + 48}{s^2 + 8s + 25} = \frac{6}{s} - \frac{6s + 48}{\left(s + 4\right)^2 + 9}$$

$$\Downarrow$$

$$Q\left(t\right) = \mathcal{L}^{-1}\left[\frac{6}{s} - \frac{6s + 48}{\left(s + 4\right)^2 + 9}\right]$$

$$\boxed{Q\left(t\right) = 6 - 6e^{4t}cos\left(3t\right) - 8e^{4t}sen\left(3t\right)}$$

$$I = \frac{dQ}{dt} = \left[6 - 6e^{4t}cos\left(3t\right) - 8e^{4t}sen\left(3t\right)\right]\frac{d}{dt}$$

$$= 6\frac{d}{dt} - 6\left[e^{4t}cos\left(3t\right)\frac{d}{dt}\right] - 8\left[e^{4t}sen\left(3t\right)\frac{d}{dt}\right]$$